EMC Measurement / Technical Report

Test Specification : FCC Part 95, Subpart C
Radio Control (R/C) Radio Service
Equipment Authorization : Type Acceptance

Manufacturer : Futaba Corporation of America

Equipment Under Test : T6YF
72–76MHz Radio Control Transmitter

Test Report No. : 75895
Purchase Order No. : IRV-1007

Document History					
Revision	**Issue Date**	**Affected Pages**	**Description of Modifications**	**Revised By**	**Approved By**
0	18 June, 1998		Initial release		

EMC Measurement / Technical Report
Document No.: 75895
from
Instrument Specialties Co. Inc.
World Compliance Center

Test for
Futaba Corporation of America
T6YF Radio Control (R/C) Transmitter
FCC ID: AZPT6YF-72

WRITTEN BY	REVIEWED BY	REVIEWED BY
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Test Personnel	*Test Dates*
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MEASUREMENT/TECHNICAL REPORT SUMMARY

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Phone	(714) 455-9888 Ext. 241
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Type of Authorization	Type Acceptance for 72–76MHz R/C Transmitter
Applicable FCC Rules	PART 95 – Radio Control (R/C) Radio Service Prepared in accordance with the requirements of FCC Rules and Regulations as listed in 47 CFR Ch.1 (10-1-96 Edition). The following subparts are applicable to the results in this test report: Part 95, Subpart C – Radio Control (R/C) Radio Service Part 95, Subpart E – Technical Regulations Part 2, Subpart J – Equipment Authorization Procedures for Type Acceptance The test data presented in this report has been acquired using the guidelines set forth in FCC Part 2 section §2.981 through §2.1005 and Part 95. The test results presented in this document are valid only for the equipment identified herein under the test conditions described. Repeatability of these test results will only be achieved with identical measurement conditions. The unit is not intended to operate while charging the Ni-Cd battery, the conducted emissions measurement is not applicable.
Equipment Under Test	72–76MHz R/C Transmitter
Production Quantity	Multiple Units
Identification of EUT	Model: T6YF FCC ID: AZPT6YF-72
Testing Date	02, 03, 15, 16 June 1998

Test Facility	Instrument Specialties Company Incorporated
Address	545 Porter Way
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1. GENERAL INFORMATION

1.1 Product Description

Equipment Under Test	72–76MHz Radio Control (R/C) Transmitter
Model Number	T6YF
Serial Number	Production Prototype
Description of EUT	The T6YF is a 72–76MHz 6 channels radio control transmitter for hobby aircraft and surface craft operation. The transmitter portion of the T6YF operates in the frequency range of 72.01 – 72.99 MHz (or 75.41 – 75.99MHz), transmitting power is less than 0.5 watts.
Clock Frequencies	6MHz, 72.55MHz (or 75.59MHz)

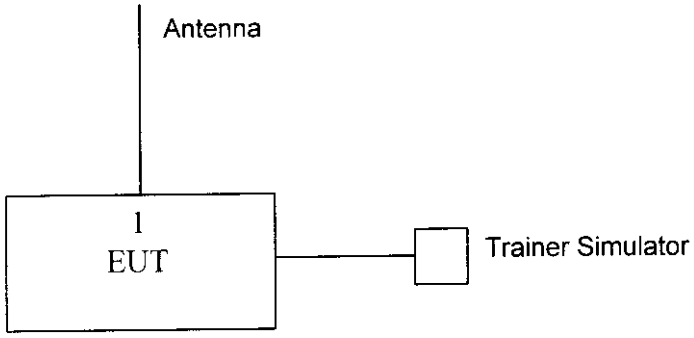
Refer to the product specification data that has been included as an attachment of this report for additional details

1.2 Configuration of Tested System

The following table lists all of the components of the tested system. FCC ID numbers are included if available for a tested system component.

Tested System Details					
Item	Manufacturer	Description	Model No.	Serial No.	FCC ID
1	Futaba	Radio Control Transmitter	T6YF	N/A	AZPT6YF-72
2	Futaba	Trainer Simulator	(Toggle Switch)	N/A	N/A

(Stand-alone Unit with integral antenna)



The Equipment Under Test (EUT) is a standalone radio control transmitter with integral antenna. The control settings on the unit were adjusted in the middle or center position. The rod antenna was adjusted to maximum length 80 cm during the test. The 9.6V battery power was charged to 11.20V during the field strength measurement. A trainer simulator (toggle switch) was attached to the EUT DIN type connector with 3 twisted wires 40 centimeters long.

1.3 Test Facility

The open area test site and measurement facility used to collect the test data is located at the Instrument Specialties Co., Inc. test facility in Placentia, CA. This site has been fully described in a report submitted to the FCC and accepted in a letter dated 5, February 1997 (31040/SIT 1300F2). The test facility is also recognized and accredited from the following accreditation organizations.

ISO 9001 (SGS ICS)	Registration Number: US94/0022 MIL-I-45208A, MIL-STD-45662A	Dated: 02/07/1994
NVLAP (NIST)	NVLAP Lab Code: 200119-0 FCC, CISPR	Dated: 12/31/1996
AUSTEL (NATA)	Listing Test House: A97/TH/014 AS / NZS 3548	Dated: 03/27/1997
I²T (Interference Tech. International)	Certificate Number: 7619 CE Mark for European Country	Dated: 03/11/1997
Acemark (Acemark Europe)	Laboratory Number: 0007 CE Mark for European Country	Dated: 03/21/1997
VCCI (Voluntary Control Council)	Registration Number: C-574~6, R-561 VCCI for Japan	Dated: 07/04/1997

2. Technical Description

Type of Emission	8K00F1D
Frequency Range	72.01 ~ 72.99 MHz and 75.41 ~ 75.99MHz
Range of Operating Power	(Fixed Output Power)
Maximum Output Power	267mW (72MHz), 250mW (75MHz)
FCC Rating Maximum Transmitting Power	750mW
Final Stage Amplifier DC Voltage, Current	Voltage: 9.6 Vdc, Current: 0.12 Amps

2.1 Circuit Diagram

Refer to Block Diagram and Circuitry in Attachment (Exhibit B).

2.2 Function of All Active Circuit Devices

Q1 (2SC1009) ; Oscillator & Multiplier
Q2 (2SC3772) ; Driver
Q3 (2SC4272) ; Final Stage RF Amplifier
Q5 (2SC2412) ; Waveform Shaper
Q6 (2SC2412) ; Trainer Buffer
Q7 (2SC2412) ; Trainer Buffer
IC1 (FP6324) ; Encoder
IC2 (BU4051) ; Encoder
IC3 (78L05) ; Voltage Regulator

2.3 Tune-up Alignment Procedure

1. Tune L1, L2, L3, L4, L5, and L6 to generate maximum power output.
2. Repeat step 1 again.
3. Turn the L6 core counterclockwise to 1/8 turn.

2.4 Frequency Stabilization circuitry

D3 (RLZJ5.1B) ; Zener diode to regulate supply voltage to oscillator
Crystal ; Stabilizes oscillating frequency
C1 (UJ68pF) ; Temperature compensated capacitors
C2 (RH100pF) ; Temperature compensated capacitors
C7 (RH39pF) ; Temperature compensated capacitors

2.5 Additional Circuit Description

a. Type of oscillator circuit utilized; Modified Colpitts Oscillator

b. Suppressor of spurious radiated emission from antenna
Low-pass modified π filter ; L4, L5 (7GD0005)
C16 (RH47pF)
C17 (RH18pF)
C19 (RH56pF)
C21 (RH47pF)

c. Audio Low Pass Filter ; C27 (2.2μF)
C28 (1nF)
Q5 (2SC2412)
R18 (10KΩ)
R19 (10KΩ)
R20 (47KΩ)

2.6 Instruction Manual(s)

See Attachment (Exhibit A).

4. TEST DATA

4.1 RF Power Output

The field strength was measured at a distance of 3 meters in the open area test site. The following formula is to be used to convert field strength (FS) to output power (TP);

$TP = (FS \times D)^2 / (30 \times G)$

Where D is the distance in meters between the antennas and G is the antenna numerical gain referenced to isotropic gain. For equipment equipped with integral antenna, G=1 is assumed. The battery power applied to the unit is 11.20V (fresh charged 9.6V battery pack).

72.55MHz: The measured field strength is 119.5 dBμV/m at 3 meters, the output power of the corresponding field strength is 0.267 watt.

75.59MHz: The measured field strength is 119.2 dBμV/m at 3 meters, the output power of the corresponding field strength is 0.250 watt.

4.2 Modulation Characteristics

The modulation signal was originated from the function IC2 (BU4051BC) and input to the encoder IC1 (FP6324). The encoder pulsed output signal was sent to buffer transistors Q6 (2SC2412) and Q7 (2SC2412) then input to modulation transistor Q5 (2SC2412). No digital modulation technique was employed. The modulation output signal and crystal oscillator was input to multiplier and oscillator transistor Q1 (2SC1009). The modulated carrier was fed to driver transistor Q2 (2SC3772) and then amplifier transistor Q3 (2SC4272). The amplified signal went through 2-section low pass filters and transmitted power to the rod antenna.

4.3 Occupied Bandwidth

Occupied bandwidth is the frequency bandwidth below its lower and above its upper frequency limits, the mean power radiated by a given emission, the measurements were made with the modulating signal. The authorized occupied bandwidth for radio control transmitter emission designation is 8KHz. The measured occupied bandwidth that was the manufacturer intended to design for sufficient control transmission. The test result plots are enclosed in appendix B pages B1-4.

Necessary bandwidth: Bn = 2M + 2D = 8.0 KHz
Where M = 2.5 KHz
D = 1.5 KHz

4.4 Radiated Spurious Field Strength

Emissions from the equipment when connected into a no gain antenna on a frequency of frequencies which are outside an occupied band sufficient to ensure transmission of information of required quality for the class of remote control desired. The reduction in the level of these spurious emissions will not affect the quality of the information being transmitted. Connect the equipment as shown in test configuration. The EUT was placed 80 centimeters above the ground plane on a non-conductive tabletop 1.0 meters wide by 1.5 meters long. The amplitude levels of the emissions were maximized by varying the configuration of the EUT and cables. The highest emissions were maximized by rotating the turntable 360 degrees and varying the antenna height 1 to 4 meters. The frequency range was measured up to 10th harmonic utilizing a BiLog antenna. Measurements were made in both vertical and horizontal polarizations. The distance between EUT and measuring antenna is 3 meters. Amplitude levels were recorded in dBμV/m. All spurious emissions were attenuated at least 50.3 dB below 72.55MHz carrier field strength, and at least 50dB below 75.59MHz carrier field strength. The tabulated data was enclosed in appendix B page B7-8.

** FCC Limit = 56 + 10 log (Po), where Po = 267mW of 72.55MHz
= 50.3dB

** FCC Limit = 56 + 10 log (Po), where Po = 250mW of 75.59MHz
= 50.0dB

4.5 Frequency Stability

The EUT carrier frequency stability is the ability of the transmitter to maintain an assigned carrier frequency over the variations of extreme ambient temperature. The EUT was placed in the temperature chamber and measured the power output with the variation of DC power input in room temperature. The temperature was set to the lowest requirement –30°C and wait for a period of at least 2 hours to reach stability inside the unit. Once the chamber temperature and inside unit thermocouple temperatures reach the –30°C, the unit was turned on and the frequency was measured within one minute with the nominal voltage. Increasing the temperature by every 10°C step to the maximum extreme temperature of this test is +50°C. For each temperature setting, wait for both chamber and unit inside thermocouple reach desired temperature and repeat the measurement. Please refer to pages B9-10 in appendix B for the test results.

APPENDIX A - TEST EQUIPMENT USED

A complete list of test equipment used for each test can be found in their perspective test procedure. The equipment absolute performance calibration, of the equipment requiring calibration, is performed on an as needed basis in accordance with MIL-STD-45662. However, calibration periods do not exceed one (1) year. The test equipment is capable of making measurements within tolerances of at least +/-2dB amplitude and +/-2% frequency deviation. Equipment certifications showing traceability to NIST (National institute of Standards and Technology) are maintained on file at Instrument Specialties Corporate offices in Delaware Water Gap, PA or Placentia CA. All equipment is checked and verified for proper operation before and after each series of tests.

A.1 Specific Equipment Used

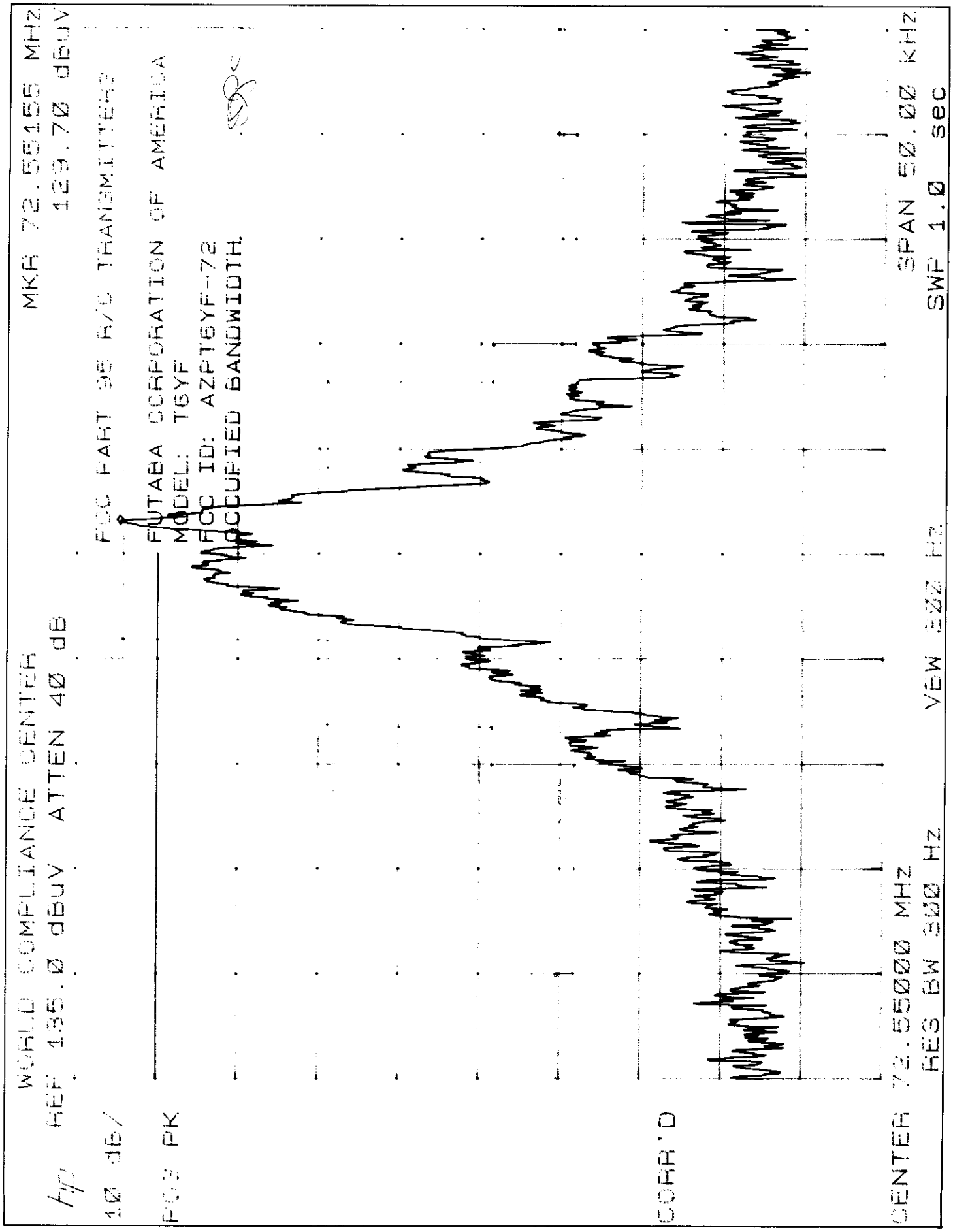
Test Instrument	*Manufacturer*	*Model No.*	*Serial No.*	*Freq. or Range*	*Cal. Due Date*
EMI Spectrum Analyzer	Hewlett Packard	8568B	2007A01154	10 KHz – 1.5 GHz	04/14/99
Quasi-Peak Adapter	Hewlett Packard	85650A	2412A00400	10 KHz – 1 GHz	04/14/99
RF Preamplifier	Mini-Circuits	ZFL-2000	017	20 MHz – 1 GHz	01/20/99
Biconical Antenna	A. H. Systems	SAS-200/540	234	20 MHz – 330 MHz	11/17/98
Log-Periodic Antenna	A. H. Systems	SAS-200/512	117	200 MHz – 1.8 GHz	11/17/98
Dipole Antenna	CDI	Roberts	N/A	25 MHz – 1 GHz	03/23/99
High Pass Filter	Mini-Circuits	NHP-100	N/A	90 MHz – 400 MHz	10/10/98
High Pass Filter	Mini-Circuits	NHP-250	N/A	225 MHz – 1.2 GHz	10/10/98
RF Coaxial Cable	Times Microwave	LMR-600	030	20 MHz – 4 GHz	12/05/98
DC Power Supply	Hewlett Packard	6236B	2735A21311	0 – 20 VDC	Calibrate in place
Signal Generator	Marconi	2022	119006-050	10 KHz – 1 GHz	11/25/98

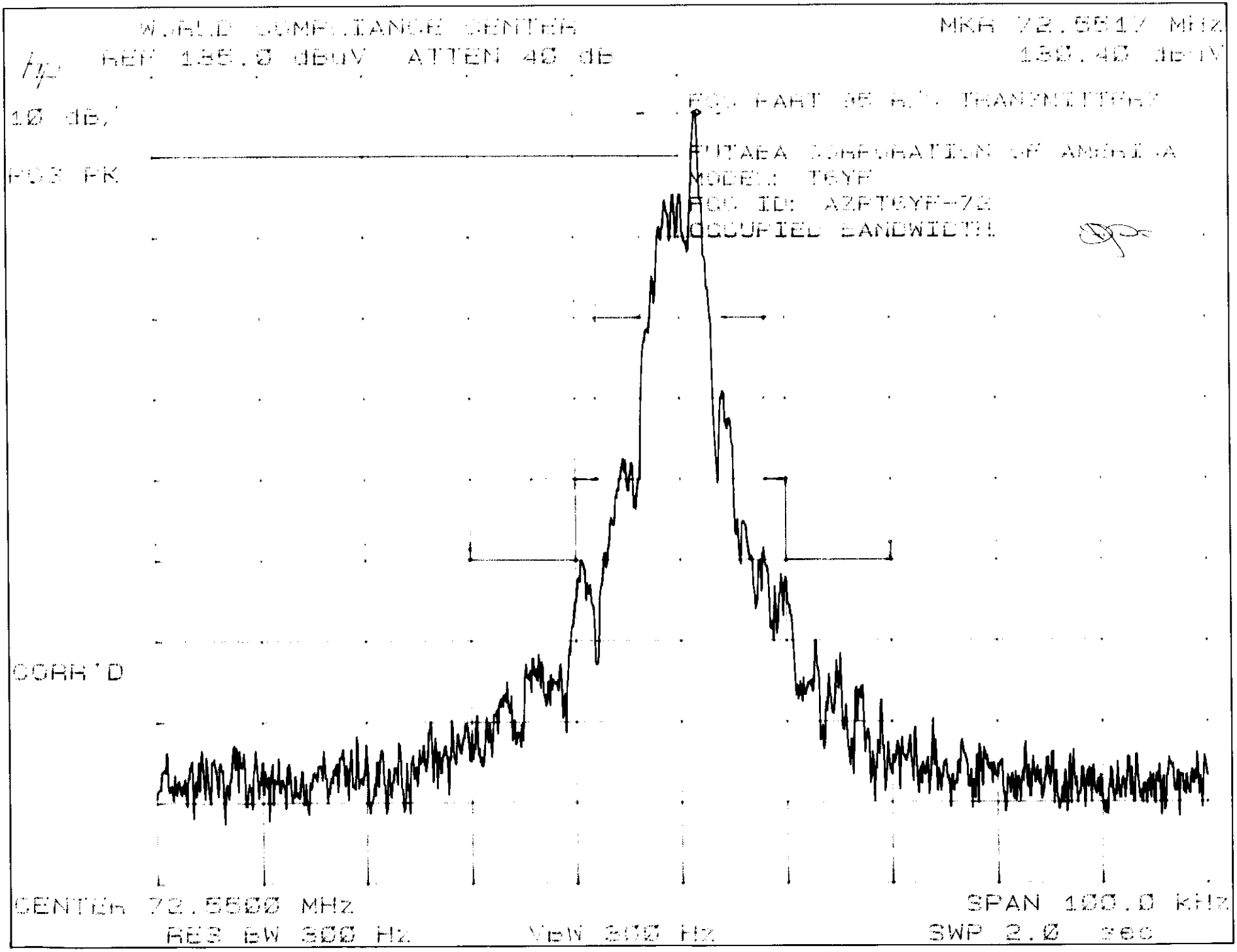
APPENDIX B – SUPPLEMENTS TEST DATA

Basic Standard	*Details*	*Data Format*	*Page No.*
Part 95, Subpart C, E Part 2 , Subpart J	Occupied Bandwidth	Plotted	B1 – B4
	Modulation Characteristic	Plotted	B5 – B6
	Radiated Spurious	Tabulated	B7 – B8
	Frequency Stability	Tabulated	B9 – B10

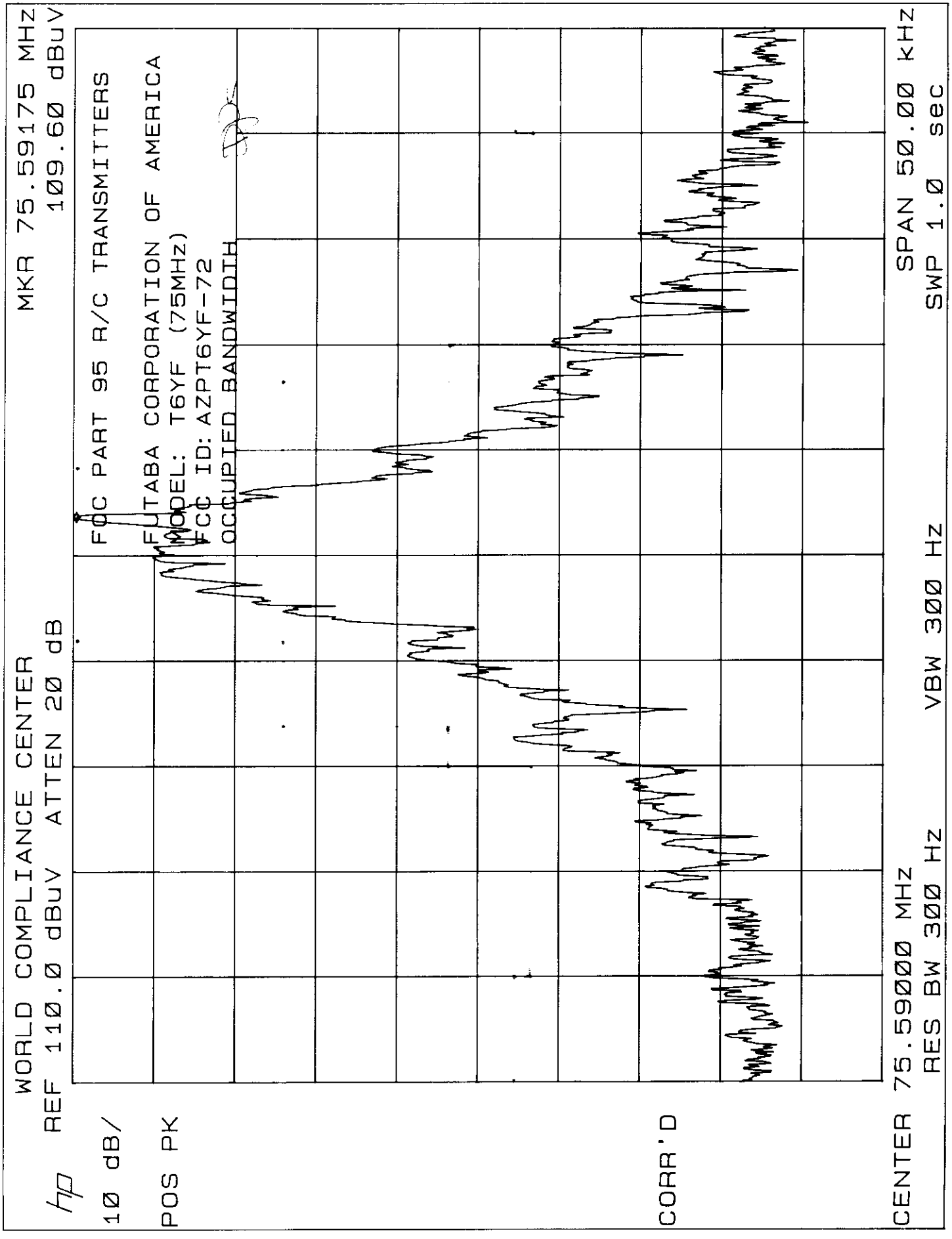
ATTACHMENTS

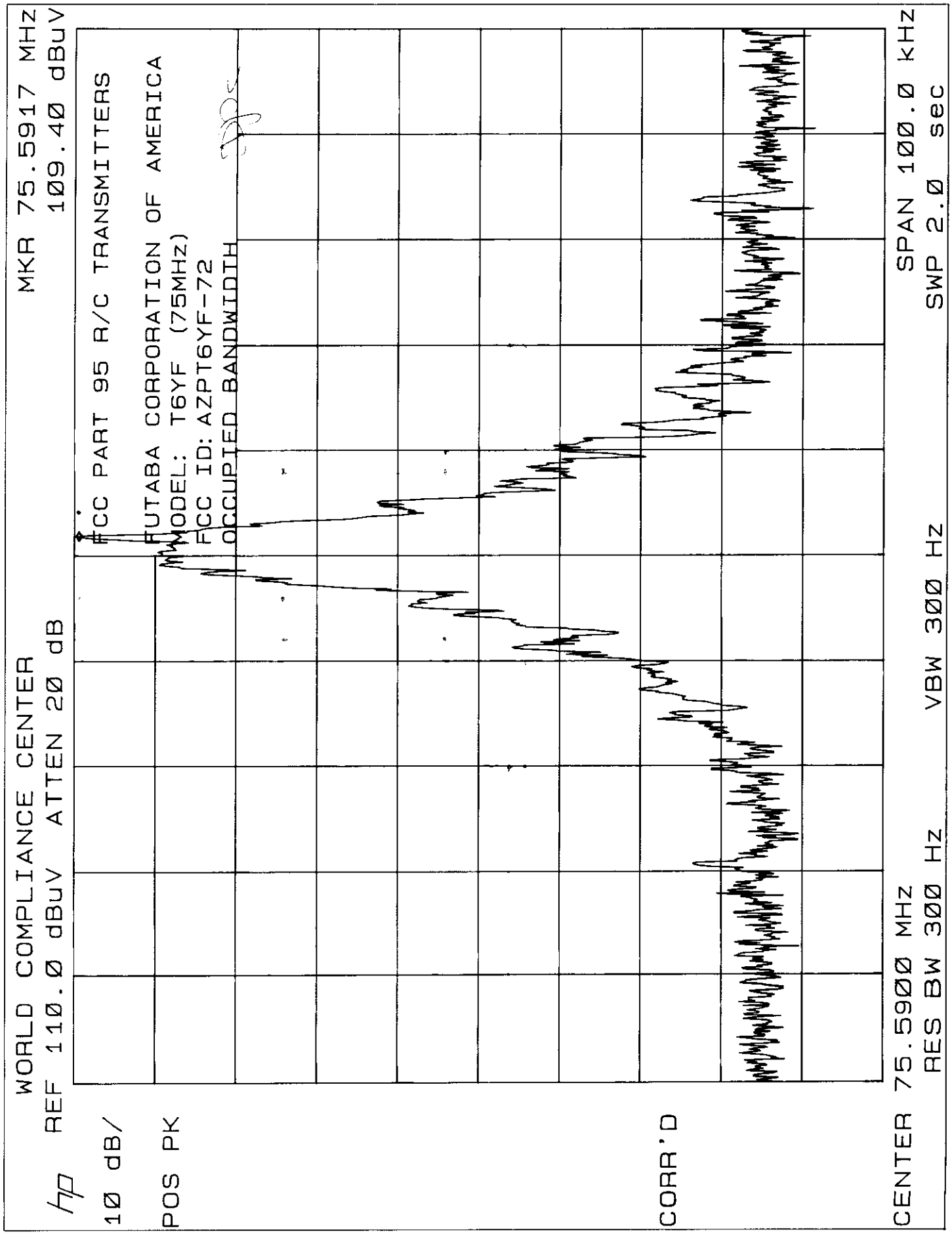
INDEX OF ATTACHMENTS

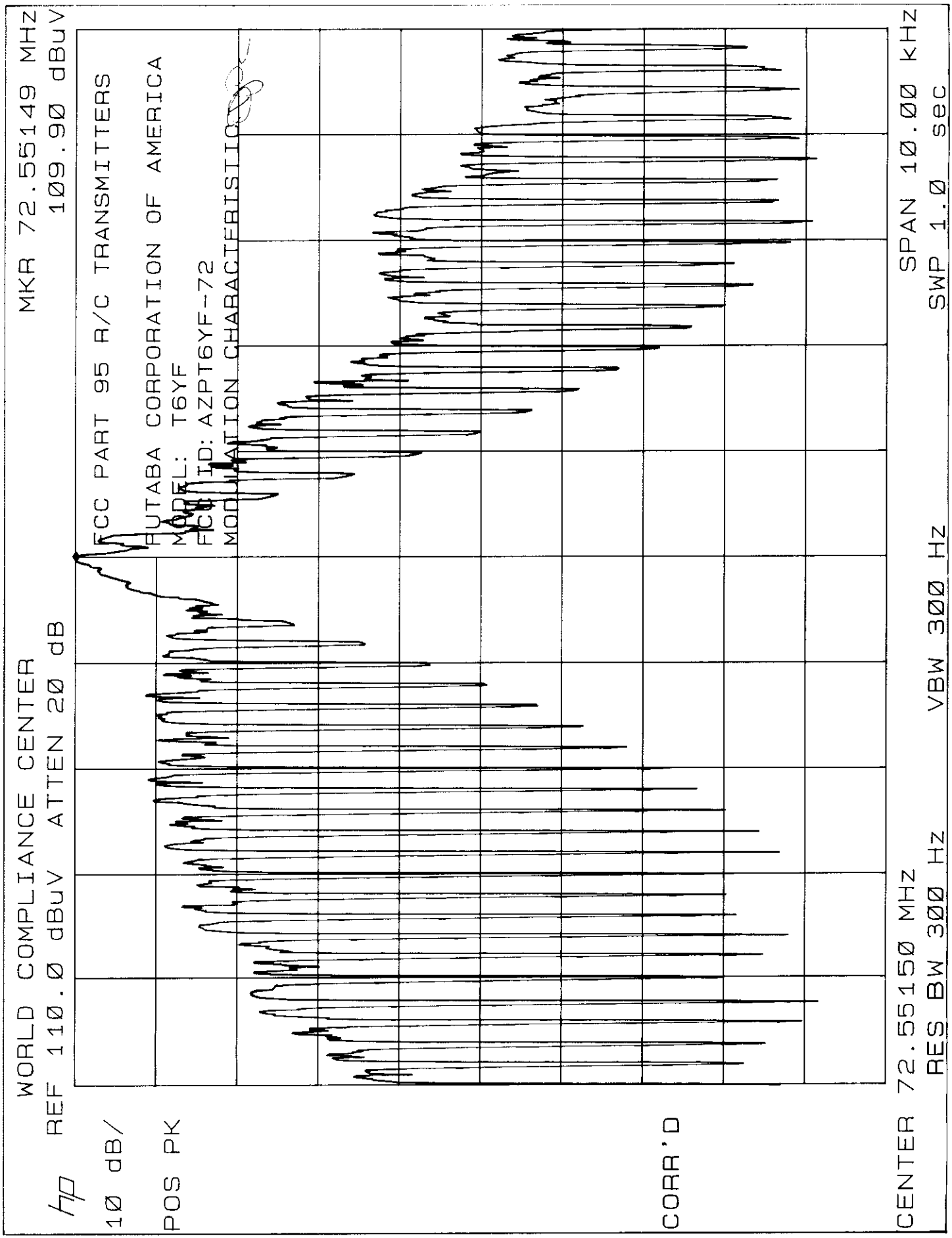

WORLD COMPLIANCE CENTER
MKR 72.551550 MHz
123.70 dBuV
REF 135.0 dBuV ATTEN 40 dB
10 dB/
FCC PART 95 R/C TRANSMITTER
FUTABA CORPORATION OF AMERICA
MODEL: T6YF
FCC ID: AZPT6YF-72
OCCUPIED BANDWIDTH
PK
CORR'D
CENTER 72.550000 MHz
SPAN 50.00 kHz
RES BW 300 Hz
VBW 300 Hz
SWP 1.0 sec

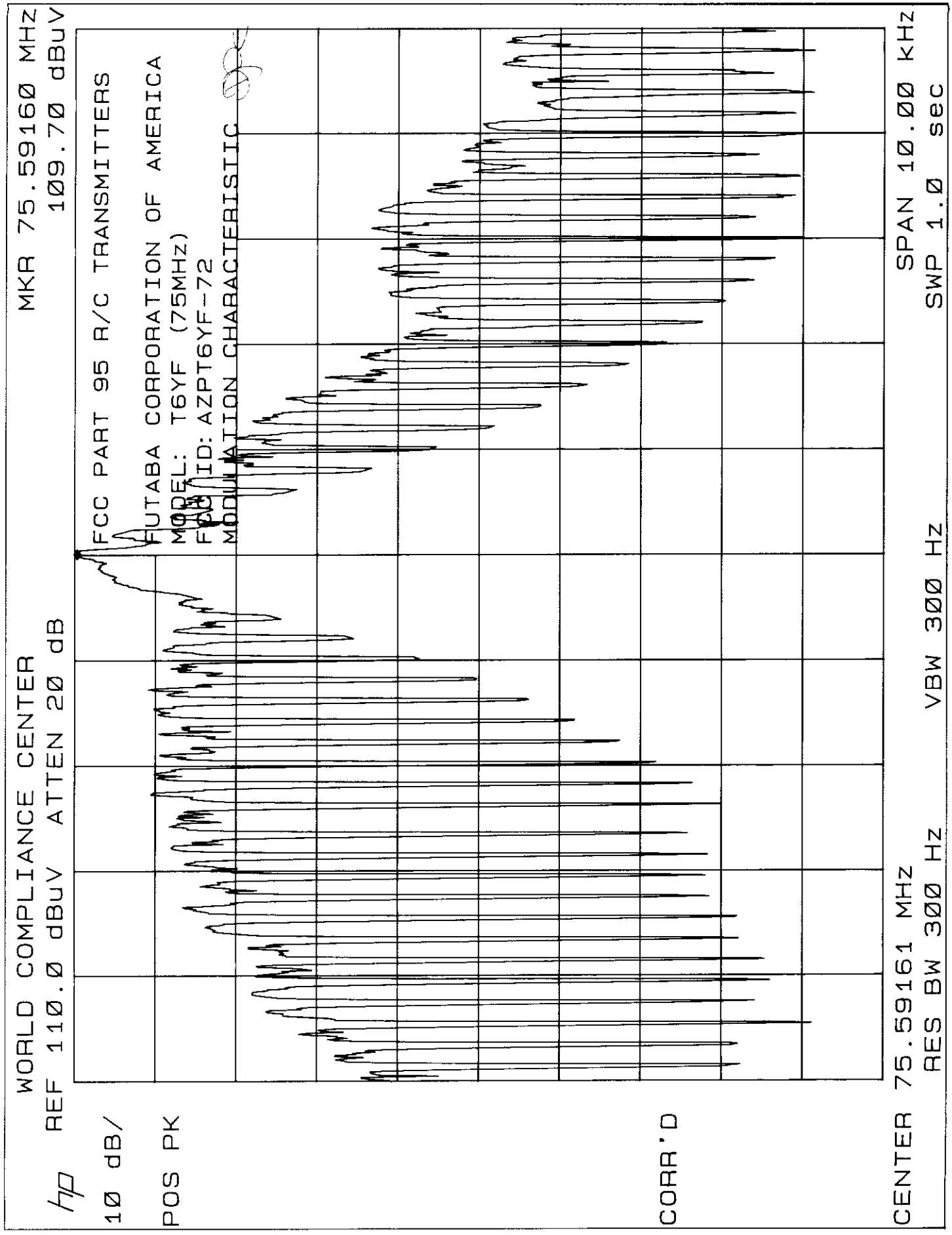

W.H.I.D COMPLIANCE CENTER
MKR 72.5517 MHz
REF 135.0 dBuV ATTEN 40 dB
135.40 dBuV
FCC PART 95 TRANSMITTER
10 dB/
EUTAEA CONFIGURATION OF AMBER
MODEL: TBYF
FCC ID: AZPTBYF-72
OCCUPIED BANDWIDTH
POS PK
CORR'D
CENTER 72.5500 MHz
SPAN 100.0 kHz
RES BW 300 Hz
VBW 300 Hz
SWP 2.0 sec

B2


WORLD COMPLIANCE CENTER
MKR 75.59175 MHz
109.60 dBuV
REF 110.0 dBuV ATTEN 20 dB
10 dB/
POS PK
FCC PART 95 R/C TRANSMITTERS
FUTABA CORPORATION OF AMERICA
MODEL: T6YF (75MHz)
FCC ID: AZPT6YF-72
OCCUPIED BANDWIDTH
CORR'D
CENTER 75.590000 MHz
SPAN 50.00 kHz
RES BW 300 Hz
VBW 300 Hz
SWP 1.0 sec


WORLD COMPLIANCE CENTER
MKR 75.5917 MHz
REF 110.0 dBuV ATTEN 20 dB
109.40 dBuV
FCC PART 95 R/C TRANSMITTERS
FUTABA CORPORATION OF AMERICA
MODEL: T6YF (75MHz)
FCC ID: AZPT6YF-72
OCCUPIED BANDWIDTH
10 dB/
POS PK
CORR'D
CENTER 75.5900 MHz
RES BW 300 Hz
VBW 300 Hz
SPAN 100.0 kHz
SWP 2.0 sec


WORLD COMPLIANCE CENTER
MKR 72.55149 MHz
REF 110.0 dBuV ATTEN 20 dB
109.90 dBuV
FCC PART 95 R/C TRANSMITTERS
FUTABA CORPORATION OF AMERICA
MODEL: T6YF
FCC ID: AZPT6YF-72
MODULATION CHARACTERISTIC
10 dB/
POS PK
CORR'D
CENTER 72.55150 MHz
RES BW 300 Hz
VBW 300 Hz
SPAN 10.00 kHz
SWP 1.0 sec


WORLD COMPLIANCE CENTER
MKR 75.59160 MHz
REF 110.0 dBuV ATTEN 20 dB
109.70 dBuV
FCC PART 95 R/C TRANSMITTERS
FUTABA CORPORATION OF AMERICA
MODEL: T6YF (75MHz)
FCC ID: AZPT6YF-72
MODULATION CHARACTERISTIC
10 dB/
POS PK
CORR'D
CENTER 75.59161 MHz
RES BW 300 Hz
VBW 300 Hz
SPAN 10.00 kHz
SWP 1.0 sec

INSTRUMENT SPECIALTIES COMPANY, INC.
World Compliance Center

Field Strength and Spurious Emissions Measurements (Reference: FCC Part 95, Subpart C, §95.635)
Frequency Tuned at: 72.55MHz
FCC OATS Radiated Emissions Data Sheet

Date: 06/02/1998

Antenna Polarity (V or H)	Frequency of Emission (MHz)	S. A. Reading (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamplifier Gain (dB)	Field Strength @ 3 meter (dBμV/m)	Attenuation Below Carrier (dBc)	FCC Limit @ 3 meter (dBc)
V	72.5515	109.3	9.0	1.2	0.0	119.5	0.0	**
H	72.5515	100.8	9.0	1.2	0.0	111.0	0.0	**
V	145.103	71.6	12.3	1.8	23.0	62.7	56.8	50.3
H	145.103	59.0	12.3	1.8	23.0	50.1	60.9	50.3
V	217.654	48.9	14.3	2.0	23.0	42.2	77.3	50.3
H	217.654	51.6	14.3	2.0	23.0	44.9	66.1	50.3
V	290.204	49.0	14.6	2.2	23.0	42.8	76.7	50.3
H	290.204	43.9	14.6	2.2	23.0	37.7	73.3	50.3
V	362.757	46.4	15.9	2.5	23.0	41.8	77.7	50.3
H	362.757	42.3	15.9	2.5	23.0	37.7	73.3	50.3
V	435.306	44.2	17.1	2.8	22.5	41.6	77.9	50.3
H	435.306	50.8	17.1	2.8	22.5	48.2	62.8	50.3
V	507.857	40.6	18.6	3.2	22.5	39.9	79.6	50.3
H	507.857	35.7	18.6	3.2	22.5	35.0	76.0	50.3
V	580.409	41.5	20.6	3.6	22.5	43.2	76.3	50.3
H	580.409	38.0	20.6	3.6	22.5	39.7	71.3	50.3
V	652.960	40.0	22.0	3.9	22.0	43.9	75.6	50.3
H	652.960	34.9	22.0	3.9	22.0	38.8	72.2	50.3
V	725.515	38.5	21.4	4.4	22.0	42.3	77.2	50.3
H	725.515	39.0	21.4	4.4	22.0	42.8	68.2	50.3

** FCC Limit; 56 + 10 Log(Po), where Po = 267mW
= 50.3dBc

INSTRUMENT SPECIALTIES COMPANY, INC.
World Compliance Center

Field Strength and Spurious Emissions Measurements (Reference: FCC Part 95, Subpart C, §95.635)
Frequency Tuned at: 75.59MHz
FCC OATS Radiated Emissions Data Sheet

Date: 06/15/1998

Antenna Polarity (V or H)	Frequency of Emission (MHz)	S. A. Reading (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamplifier Gain (dB)	Field Strength @ 3 meter (dBμV/m)	Attenuation Below Carrier (dBc)	FCC Limit @ 3 meter (dBc)
V	75.5918	109.1	8.9	1.2	0.0	119.2	0.0	**
H	75.5918	102.6	8.9	1.2	0.0	112.7	0.0	**
V	151.184	67.6	12.3	1.8	23.0	58.7	60.5	50.0
H	151.184	60.3	12.3	1.8	23.0	51.4	61.3	50.0
V	226.775	49.6	14.6	2.0	23.0	43.2	76.0	50.0
H	226.775	50.8	14.6	2.0	23.0	44.4	68.3	50.0
V	302.367	50.2	14.7	2.2	23.0	44.1	75.1	50.0
H	302.367	42.8	14.7	2.2	23.0	36.7	76.0	50.0
V	377.959	50.6	16.3	2.5	23.0	46.4	72.8	50.0
H	377.959	44.5	16.3	2.5	23.0	40.3	72.4	50.0
V	453.550	43.4	17.2	2.8	22.5	40.9	78.3	50.0
H	453.550	48.8	17.2	2.8	22.5	46.3	66.4	50.0
V	529.142	41.8	18.5	3.2	22.5	41.0	78.2	50.0
H	529.142	37.6	18.5	3.2	22.5	36.8	75.9	50.0
V	604.734	43.5	21.2	3.6	22.5	45.8	73.4	50.0
H	604.734	37.5	21.2	3.6	22.5	39.8	72.9	50.0
V	680.326	42.3	21.0	3.9	22.0	45.2	74.0	50.0
H	680.326	36.7	21.0	3.9	22.0	39.6	73.1	50.0
V	755.918	39.0	22.2	4.4	22.0	43.6	75.6	50.0
H	755.918	40.4	22.2	4.4	22.0	45.0	67.7	50.0

** FCC Limit; 56 + 10 Log(Po), where Po = 250mW
= 50.0dBc

INSTRUMENT SPECIALTIES COMPANY, INC.
World Compliance Center

Frequency Stability Measurements (Reference: FCC Part 2, Subpart J, §2.995)
Frequency Tuned at: 72.55MHz
Frequency Stability vs. Temperature Data Sheet

Date: 06/03/1998

Temperature (°C)	DC Power Supply Voltage (11.20V)		Frequency Deviation (MHz)	FCC Limit Δf = 0.002% (MHz)
	Frequency Measured (MHz)	Output Power (dBm)		
+24	72.551550	-	0	0.001451
–30	72.551637	-	+0.000087	0.001451
–20	72.551901	-	+0.000351	0.001451
–10	72.552036	-	+0.000486	0.001451
0	72.552089	-	+0.000539	0.001451
+10	72.551898	-	+0.000348	0.001451
+20	72.551702	-	+0.000152	0.001451
+30	72.551478	-	–0.000072	0.001451
+40	72.551274	-	–0.000276	0.001451
+50	72.551236	-	–0.000314	0.001451

Frequency Stability vs. Supply Voltage Data Sheet

Date: 06/03/1998

DC Input Voltage (V)	Temperature (24°C)		Frequency Deviation (MHz)	FCC Limit Δf = 0.002% (MHz)
	Frequency Measured (MHz)	Output Power (dBm)		
7.68	72.551533	-	–0.000017	0.001451
8.00	72.551615	-	+0.000065	0.001451
8.50	72.551670	-	+0.000120	0.001451
9.00	72.551719	-	+0.000169	0.001451
9.60	72.551764	-	+0.000214	0.001451
10.00	72.551781	-	+0.000231	0.001451
10.50	72.551801	-	+0.000251	0.001451
11.00	72.551819	-	+0.000269	0.001451
11.52	72.551831	-	+0.000281	0.001451

INSTRUMENT SPECIALTIES COMPANY, INC.
World Compliance Center

Frequency Stability Measurements (Reference: FCC Part 2, Subpart J, §2.995)
Frequency Tuned at: 75.59MHz
Frequency Stability vs. Temperature Data Sheet

Date: 06/16/1998

Temperature (°C)	DC Power Supply Voltage (11.20V)		Frequency Deviation (MHz)	FCC Limit Δf = 0.002% (MHz)
	Frequency Measured (MHz)	Output Power (dBm)		
+22	75.591750	-	0	0.001512
–30	75.591357	-	–0.000393	0.001512
–20	75.591633	-	–0.000117	0.001512
–10	75.591906	-	+0.000156	0.001512
0	75.592020	-	+0.000270	0.001512
+10	75.592106	-	+0.000356	0.001512
+20	75.592027	-	+0.000277	0.001512
+30	75.591866	-	+0.000116	0.001512
+40	75.591657	-	–0.000093	0.001512
+50	75.591655	-	–0.000095	0.001512

Frequency Stability vs. Supply Voltage Data Sheet

Date: 06/16/1998

DC Input Voltage (V)	Temperature (22°C)		Frequency Deviation (MHz)	FCC Limit Δf = 0.002% (MHz)
	Frequency Measured (MHz)	Output Power (dBm)		
7.68	75.591490	-	–0.000260	0.001512
8.00	75.591596	-	–0.000154	0.001512
8.50	75.591647	-	–0.000103	0.001512
9.00	75.591690	-	–0.000060	0.001512
9.60	75.591728	-	–0.000022	0.001512
10.00	75.591745	-	–0.000005	0.001512
10.50	75.591763	-	+0.000013	0.001512
11.00	75.591771	-	+0.000021	0.001512
11.52	75.591779	-	+0.000029	0.001512